(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number : **0 609 951 A1**

(12) EUROPEAN PATENT APPLICATION

(21) Application number : **94200279.1**

(51) Int. Cl.[5] : **E06B 3/94**

(22) Date of filing : **02.02.94**

(30) Priority : **04.02.93 NL 9300232**

(43) Date of publication of application :
10.08.94 Bulletin 94/32

(84) Designated Contracting States :
BE DE FR GB NL SE

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(54) Self-straightening folding wall.

(57) A folding wall consisting of rows of panels connected to each other for mutual pivoting, which rows are disposed at a distance from and parallel to each other and guided by a common guide rail (6), wherein one or more spacers (10) are arranged hingedly between pairs of mutually opposite panels, wherein at least one spring element (14) is connected to the mutually opposite panels of a pair, wherein a tilting member (16) supporting against the rail (6) is arranged on each panel, this such that the panels are straightened into the closing position by the spring mechanism (14) and are spread into the opened position by this same spring mechanism (14).

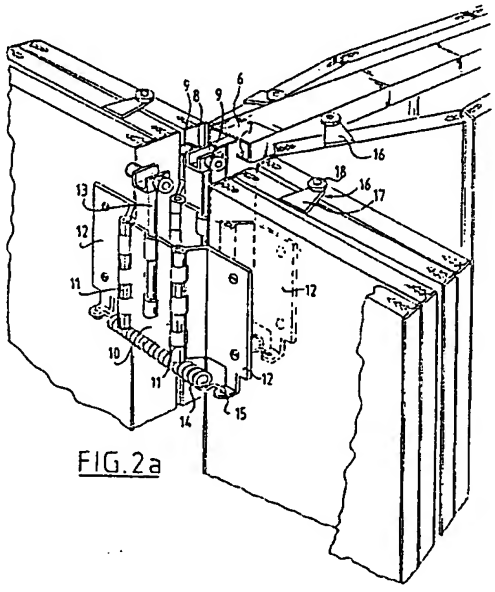
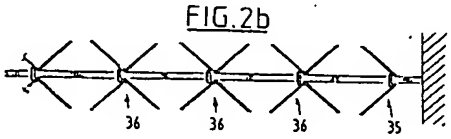


FIG.2a

FIG.2b



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The invention relates to a folding wall consisting of rows of panels connected to each other for mutual pivoting, which rows are disposed at a distance from and parallel to each other and guided by a common guide rail, wherein one or more spacers are arranged hingedly between pairs of mutually opposite panels.

Such folding walls can consist of quite large panels, which confronts the user with the problem that in the closed position the panels are difficult to place flush with each other. In the past different mechanisms have been envisaged for this purpose with which this self-straightening takes place more or less automatically. Such mechanisms are generally embodied in complicated manner, which not only increases the total weight of the folding wall but which also has an adverse effect on the cost price.

The invention has for its object to improve such a self-straightening mechanism and provides for this purpose a folding wall which is distinguished in that at least one spring element is connected to the mutually opposite panels of a pair, wherein a tilting member supporting against the rail is arranged on each panel.

The self-straightening mechanism proposed by the invention therefore consists of only one or more spring elements, preferably in the form of a helical spring, in addition to a tilting member located a distance therefrom. The springs apply a moment to the standing hinges between the adjacent panels which ensures a self-straightening of the panels. Folding open of the wall is nevertheless facilitated by the arranged tilting member, whereby it is easier for the user to fold the panels of the wall in a group against each other.

According to a further development, the or each spacer is provided with L-shaped hinge wings connected to the panels and between which the spring is arranged. This offers the advantage that in the folded-up position of the panels the spring likewise applies a moment which enhances this folded-up position. This results in a stable folded group without the user having to exert an extra pressure force thereon.

In one embodiment the spring is embodied as helical spring. The centre line of the helical spring can herein lie perpendicularly of the mutually opposite and parallel panels.

In another embodiment this centre line can run parallel to the mutually opposite panels.

In yet another embodiment the spring is U-shaped, wherein the legs are fixed to the L-shaped hinge wings and the body portion to the spacer.

The invention is further elucidated in the figure description hereinbelow of two embodiments. In the drawing:

fig. 1 shows a perspective view of a folding wall according to the invention,

fig. 2a shows a perspective view of a part of the folding wall of fig. 1 provided with a helical spring with horizontally lying centre line,

fig. 2b shows a schematic top view of the folding wall according to the invention constructed -from modules,

fig. 3 is a top view of the first embodiment according to fig. 2, in which the spring action is shown schematically,

fig. 4 shows a perspective view corresponding with fig. 2 of a second embodiment wherein the helical spring has a standing centre line,

fig. 5 is a front view of a spacer with hinge wings and a third embodiment of a spring arranged therebetween,

fig. 6a, b, c show in each case a schematic top view of the spacer with hinge wings and spring arranged therebetween in three active positions,

fig. 7 is a front view corresponding with fig. 5 of a spacer with hinge wings and a fourth embodiment of a spring.

Designated with the numeral 1 is a folding wall which serves to close off an opening 2 of a building.

The folding wall consists of two rows of mutually adjacent panels 3, 4 which are connected to each other for mutual pivoting along their standing side edge 5. Random hinges can be used for this purpose, for instance plastic hinges which extend over the whole length of side edge 5, piano or other types of hinges. The hinges are arranged between the panels alternatingly on the inside and outside such that the panels can be placed against each other in zigzag shape.

Arranged along the top of the folding wall in the embodiment shown in fig. 1 is a guide rail 6 which must be fixed against a ceiling construction (not shown). This runner or guide rail is in cross section a tube profile, see fig. 2, such that along the lower flanges 7 thereof rails are formed for guiding carriages 8 with travel wheels 9.

Arranged between the two mutually opposite panels are spacers 10 which are connected hingedly at 11 to L-shaped hinge wings 12. The latter are fixed to the inside of the panel.

Although not shown in fig. 2, it is assumed known that a number of spacers 10 are arranged one above another along the mutually facing side edges of the mutually opposite panels. The upper spacers 10 are connected to the carriage 8 via a suspending pin 13.

On the underside of the upper spacers and/or spacers located thereunder is a helical spring 14, the extremities of which engage onto fastening eyelets 15 of L-shaped hinge wings 12.

Arranged on the panel in each case on the inside along the top edge thereof is a tilting member 16 which consists of an arm 17 protruding over the surface of the panel, on which arm a roller 18 is arranged for free rotation.

The action of the self-straightening mechanism is further elucidated in fig. 3.

During self-straightening the spring 14 will exert

a force on the L-shaped hinge wings 12, of which the line of force lies to the sides of the hinges 11 of the spacer 10. A moment will hereby be applied to the hinge wings 12 which will want to move the panels 3 connected thereto toward each other until they stand mutually parallel. Due to the tilting member 16 the correct spacing therebetween is retained so that the mutually opposite panels come to lie precisely parallel to each other.

In the position of the spring 14 drawn in dashed lines at the bottom of fig. 3 the panel 3 is splayed outward so that the line of force of spring 14 extends beyond the pivot axes 11, whereby a moment is applied to hinge wings 12 and therefore to panel 3 which points outward, whereby the panels are urged in the direction of the arrow P1.

The user therefore only has to carry the panels beyond the dead point of pivot axes 11, whereby complete folding-up of the panels against each other is facilitated or full extension of the panels into the parallel position takes place automatically.

Carrying of the panels from the straightened position to the folded-up position can be greatly facilitated by embodying the end panel 20 in fig. 1 with a hand-grip 21 so that the user can pull apart the end panels. Due to this pulling apart the draw spring in the adjacent panels 4 will pull the hinge edge in the direction of the rail 6, which results in the following panel group 4 swivelling on tilting member 16 whereby the following panels in each case will assume an angular position relative to each other, which enhances pushing of the panels into the folded-up position.

Fig. 4 shows an alternative embodiment, wherein the helical spring 14' is embodied with two arms 22 which are fixed non-rotatably onto pins 23 of a support 24. Supports 24 are arranged on the inside of the panel pair 4. The spacer 10 is again fixed via two hinge pins 11 with associated hinge wings 12 to a piano hinge 5 between the adjacent panels 4, 3.

The helical spring 14 has a centre line which extends parallel between the panels 4 and provides in the position drawn in fig. 4 an inward directed moment of the panels 4 on the pivot axis 11. The panels are hereby straightened parallel to each other. When panels 4 are pivoted outward the spring 14' will initially want to prevent this movement until the dead point round the pivot axis 11 has again been reached and folding-up is facilitated in the sense outlined above according to fig. 3.

Fig. 5 shows a third embodiment of a spring element which operates between the hinge wings.

The spring element is embodied here substantially as a U-shaped torsion spring, wherein the legs 30 are connected to the hinge wings 12 by means of an eyelet 31.

The body 32 of the spring element is connected rotatably to a sleeve 33 moulded onto the hinge plate or spacer 10. A helically formed coil is arranged between the legs 30 and the body 33 of the spring element. This coil has a centre line lying perpendicular of hinge plate 10.

During folding-up and folding-out of the folding wall the spring element will exert an inward directed force on hinge wings 12, this as in the case of helical spring 14 according to fig. 2.

Various matters are shown in fig. 6a, b and c, wherein the diverse positions of hinge wings 12 are drawn with the associated positions of the legs 30 of the spring-like element.

Fig. 6a shows the situation that the wings 12 run mutually parallel, wherein the legs 30 exert the inward directed force in order to provide the self-straightening action on the folding wall.

During folding open as according to fig. 6b the wings 12 will have a position at a certain point such that the legs 30 of the spring element are spread as widely as possible. When this point as in fig. 6b has been passed, the legs will be able to move toward one another again, into the position according to fig. 6c in which the folding wall panels are fully spread and stand mutually in line, wherein the folding wall is pressed fully open. The U-shaped spring element here also provides an inward directed force on the eyelets 31 respectively the hinge wings 12 which, due to the shifted point of rotation of the hinge, exert a counter-clockwise moment and therefore hold the panels spread open.

Fig. 7 shows an alternative embodiment of the U-shaped spring element, wherein the helical coils in the transition between the leg 30 and the body 33 are omitted. The action of this U-shaped spring is identical to that of fig. 5.

In general the folding wall as according to all the figures can be embodied in a modular structure. That is, each module consists of four panels which are mutually connected with that edge which faces toward the spacer respectively hinge and draw spring. These matters are shown in fig. 2b. The advantage of such a modular structure is that the outside of the panels, which are packed during transport from factory to the place of destination, lie in protected position because the panels lie flat against each other with the outsides against one another. Constructing of the folding wall can take place in modular manner, that is, that after arranging a first set of panels, see half-module 35 in fig. 2b, a module of four panels at a time can then be hung from the top rail. The outward facing edges can subsequently then be mutually joined by a coupling hinge strip 36, see fig. 2a. A total folding wall can thus be realized in simple manner with a number of modules 36 as according to fig. 2b, wherein the fitting operations at the place of destination are limited to a minimum.

Other embodiments are possible within the scope of the invention.

Claims

1. Folding wall consisting of rows of panels connected to each other for mutual pivoting, which rows are disposed at a distance from and parallel to each other and guided by a common guide rail, wherein one or more spacers are arranged hingedly between pairs of mutually opposite panels, **characterized in that** at least one spring element is connected to the mutually opposite panels of a pair, wherein a tilting member supporting against the rail is arranged on each panel.

2. Folding wall as claimed in claim 1, **characterized in that** the spacer is provided with hinge wings arranged hingedly on either side thereof and each of which is fixed to a panel of the pair.

3. Folding wall as claimed in claim 2, **characterized in that** the spring is arranged between the hinge wings of a spacer.

4. Folding wall as claimed in claims 2 and 3, **characterized in that** the hinge wing is L-shaped in cross section.

5. Folding wall as claimed in any of the claims 1-4, **characterized in that** the spring element is embodied as helical spring.

6. Folding wall as claimed in claim 5, **characterized in that** the centre line of the helical spring lies perpendicular to the mutually opposite standing panels when these panels are directed parallel to each other.

7. Folding wall as claimed in claim 3, **characterized in that** the spring is a U-shaped torsion spring and the legs thereof are fixed to the hinge wings and the body portion to the spacer.

8. Folding wall as claimed in claim 7, **characterized in that** the U-shaped spring is provided with one or more helical coils in the transition from body part to leg.

9. Folding wall as claimed in any of the foregoing claims, which is constructed from modules consisting of at least four mutually pre-connected panels, **characterized in that** the panels are connected hingedly to each other with the standing edge facing the straightening spring in order to form a cross-shaped module.

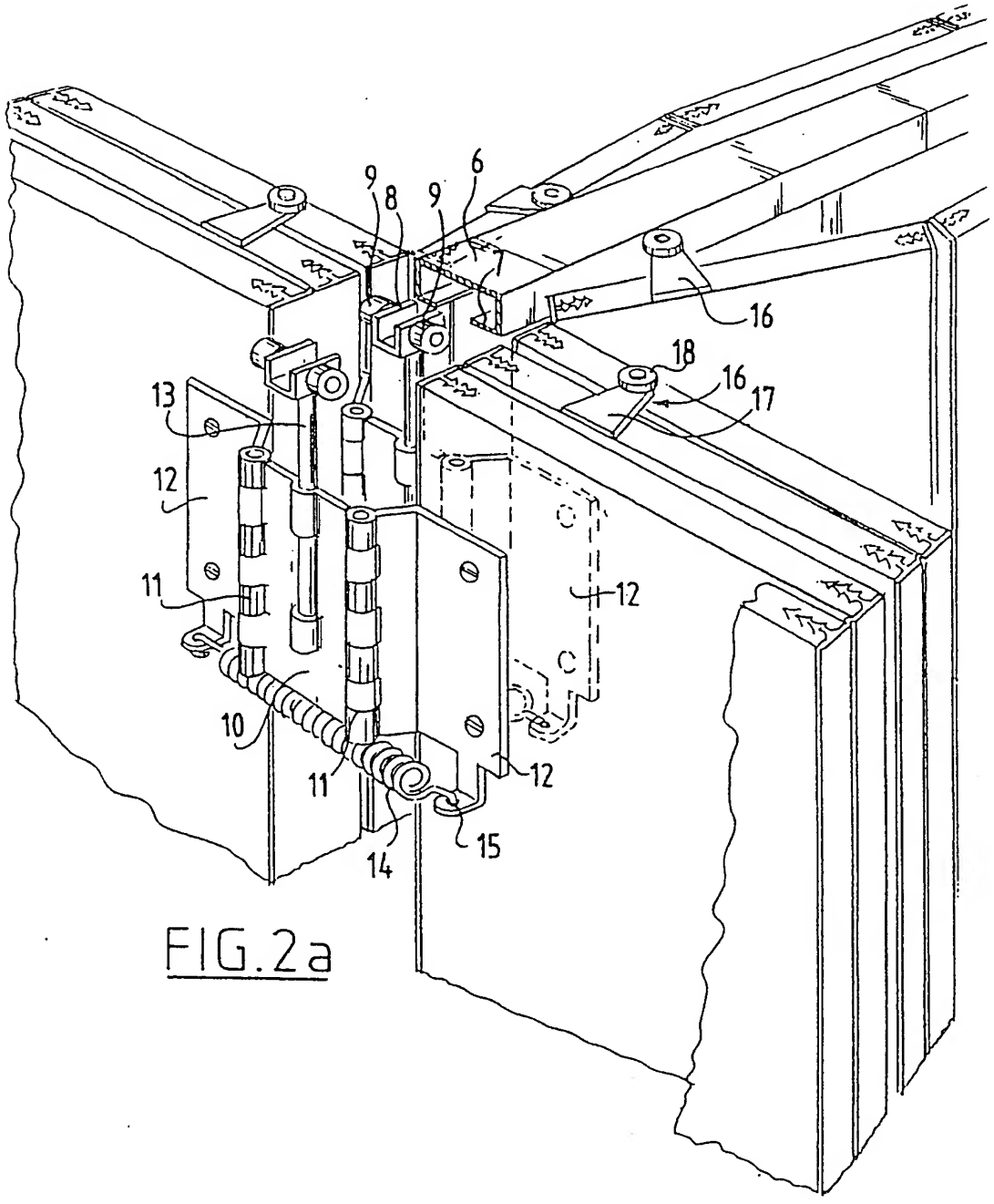
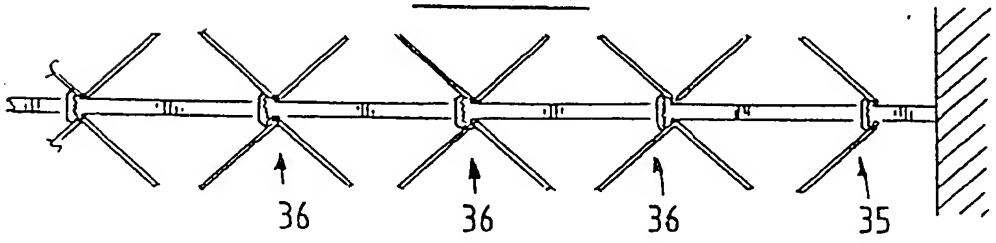


FIG.2a

FIG.2b



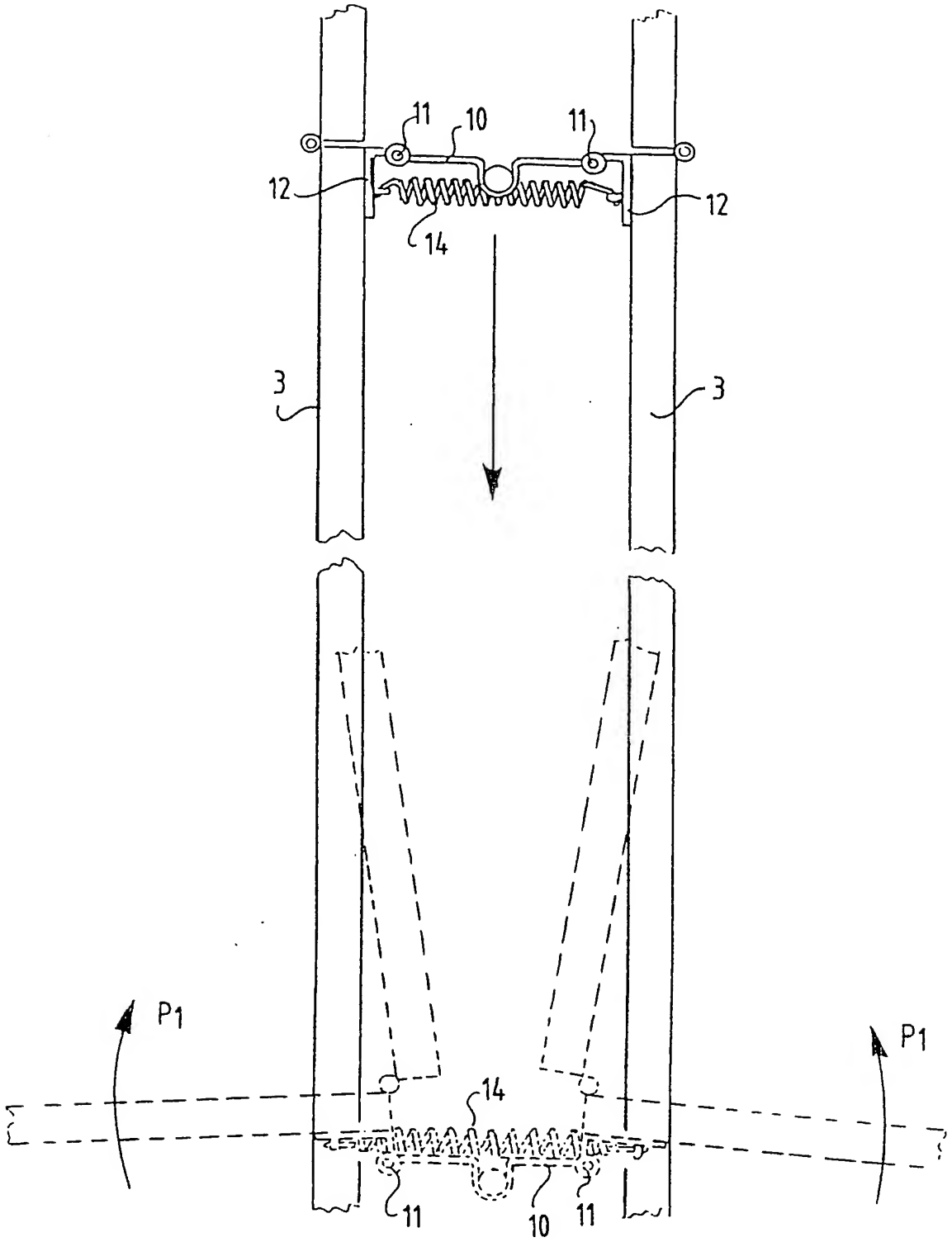


FIG.3

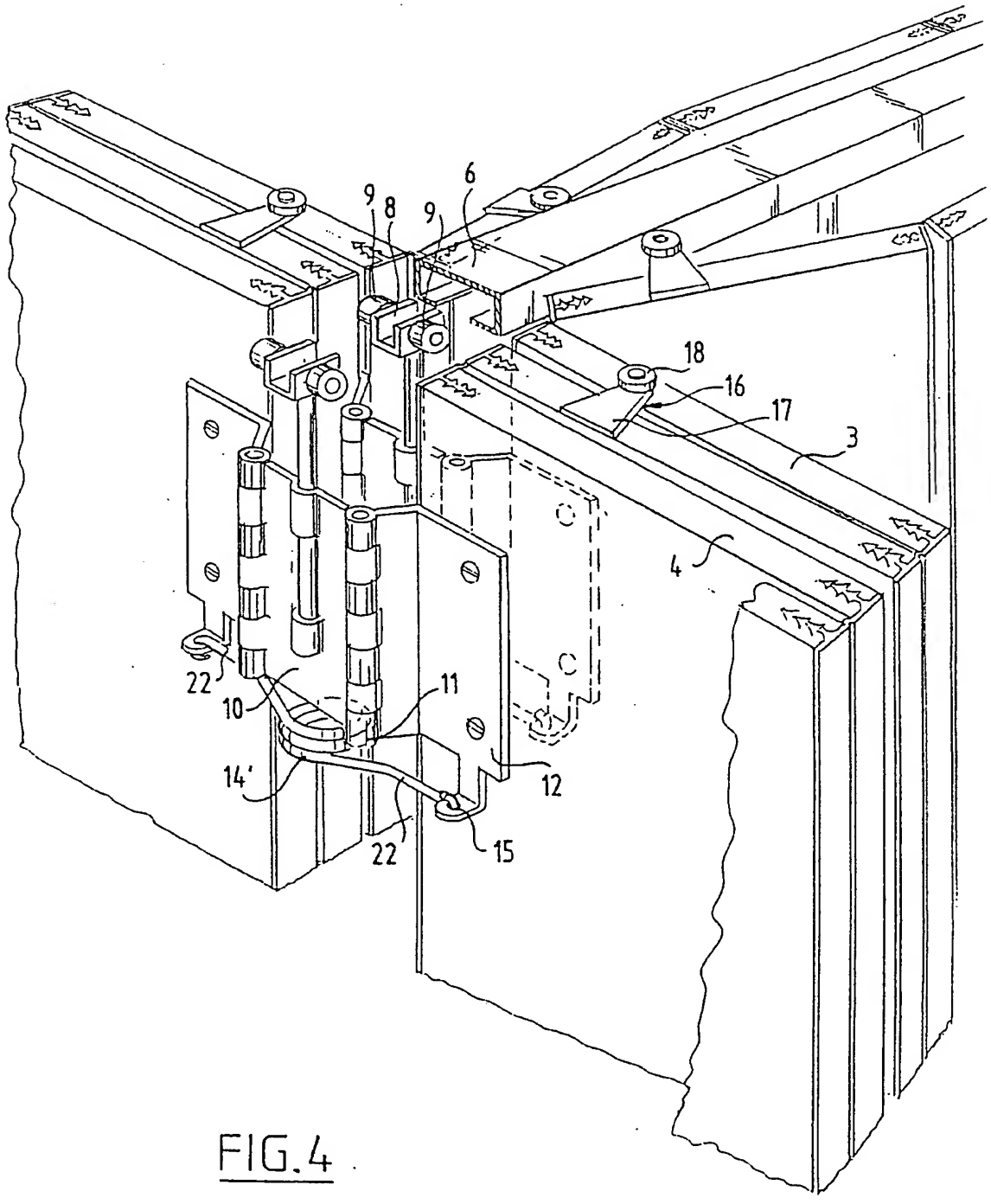


FIG.4

FIG.5

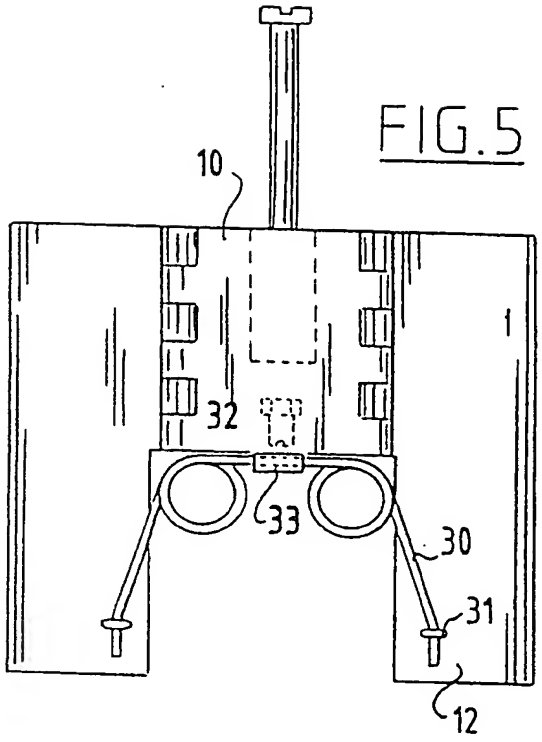


FIG.6a

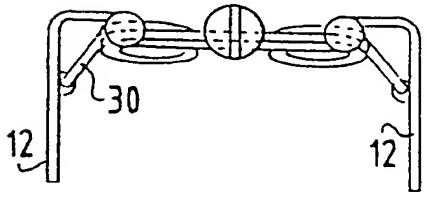


FIG.6b

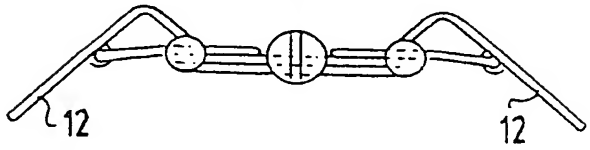
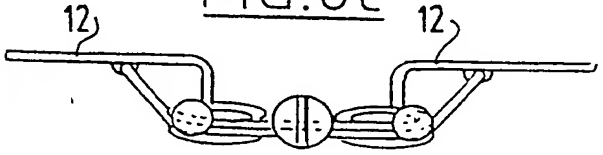


FIG.6c



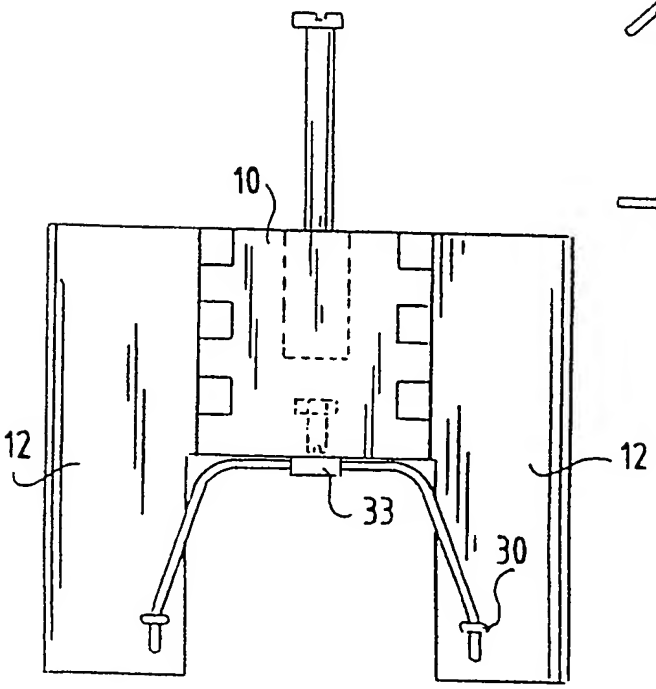


FIG.7

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EUROPEAN SEARCH REPORT

Application Number
EP 94 20 0279

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.5)
A	DE-A-28 45 033 (LIGNACORD) * page 8, line 28 - page 15, line 18; figures 1,2 *	1-3,5	E06B3/94
A	NL-A-7 513 866 (HÜPPE) * page 5, line 2 - page 7, line 14; figures *	1,3-6	
A	CH-A-349 777 (MISCHLER) * page 1, line 29 - page 2, line 35; figures *	1,5-7	
A	DE-A-20 61 866 (HÜPPE) * page 6, paragraph 3 * * page 10, paragraph 2 - page 11, paragraph 2 * * figures 1,2,8,9 *	7,8	
A	NL-A-9 200 181 (PELLA) * claim 1; figures *	9	
			TECHNICAL FIELDS SEARCHED (Int.Cl.5)
			E06B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	26 April 1994	Depoorter, F

CATEGORY OF CITED DOCUMENTS

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